

## Offshore fish farming

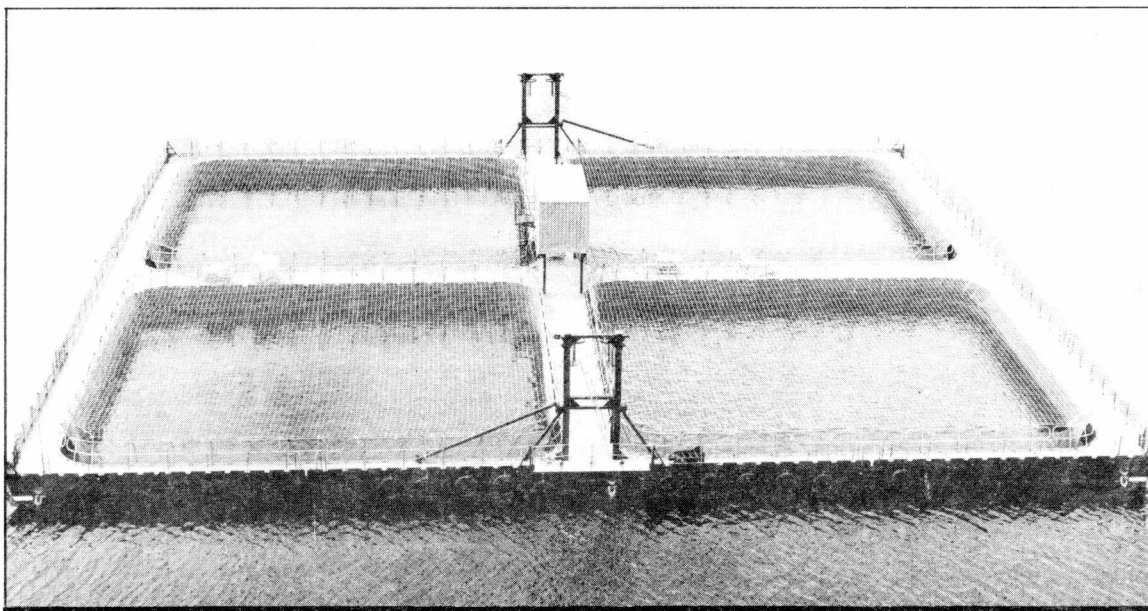
Marine fish farming in pens and cages is new, and concentrates mainly on intensive production of high-value fish. Species grown in offshore farms include yellowtail and red sea bream in Japan, sea bass and sea bream in the Mediterranean, and Atlantic salmon in western Europe. The salmon industry provides the most dramatic illustration of technical developments in offshore fish farming.

Atlantic salmon farming is dominated by Norway. Scotland and Ireland are also major producers. Other producers include Chile, Canada, Australia, Faroe Islands, and Iceland. At the end of the '70s, about 20 000 tons of salmon have been produced by aquaculture and up to 360 000 tons are forecast by the year 2000.

### The need to move offshore

Three strong motivations for offshore fish farming:

- Urban and industrial pollution has prevented the development of inshore fish farms. In some areas, there are simply no more suitable or undeveloped sites.
- The strong pressure to preserve the remaining mangroves and coral reefs. (See also the impact of seafarming, this issue.)
- The potential profitability of offshore farming in countries that do not have sheltered coasts but have suitable water quality.



**A prototype offshore cage system built by a Scottish shipyard. For further information, contact: Campbeltown Developments Ltd., Trench Point, Campbeltown, Argyll PA 28 6EP. Fax: +44 586 552 728.**

Source: *Fishfarming International*, Aug 1993.

## The challenge

In the more exposed offshore environment, the cage unit is at the mercy of wind and waves. The cage must withstand these forces. This is not in itself a difficult task given the technology for oil production at sea. Oil rigs can withstand the most extreme conditions and there are very few mechanical failures. The important factor in offshore farming is the cost, which must be justified by the value of the fish produced. It is appropriate technology at the right price.

The next consideration is management. The ideal offshore system should be fully equipped and mechanized to allow automation of monitoring and control. The economics of fish farming do not allow helicopter transport of staff yet!

Fully serviced systems are being evaluated by a Norwegian company. The system has its own accommodation, power, automated feeding system, and equipment for mechanical grading, harvesting and off-loading of fish. The steel structure is 126 x 32 meters wide, with a total volume of 25 000 m<sup>3</sup>. Annual production is estimated at 500-700 tons.

Other concepts include a "mother" platform, containing all support services, surrounded by submersible "satellite" production units. The culture units are protected from waves and wind and could even allow aquaculture under ice in Atlantic Canada, for example.

Finally, the effect of the offshore environment on the fish must be studied. More exposed conditions may cause stress or damage to stock.

## What of the future?

The potential for offshore fish farming is enormous. However, it is costly, and can therefore happen only in buoyant markets. The market for farmed fish may or may not continue to grow at its present remarkable rate. But, under the right circumstances, offshore fish farming will dramatically increase marine fish production from aquaculture.

Source: C Clarke and M Beveridge. *Offshore fish farming*. INFOFISH International 3/89.

# SEA RANCHING

*To improve productivity, aquaculture development will involve the dispersal of 50% of government-produced milkfish and shrimp to the open sea.*

- Philippine Department of Agriculture  
Medium-term Development Plan

Migratory fish species such as salmonids have long been ranched in the western USA and in Japan. With the emergence of cheap mass-produced seed, sea ranching of other species has been tried -- red sea bream and kuruma shrimp (*Penaeus japonicus*) in Japan, tiger shrimp in Taiwan, and *Trochus* and the giant clams in several Pacific Island countries.

Japan releases 2/3 of all hatchery raised kuruma shrimp in open waters -- about 600 million fry a year.

In PR China, the government has released artificially hatched juvenile marine shrimp (*Penaeus orientalis*) in the open sea. In 1986, more than 4 billion juveniles were released in the Pohai Sea and the Yellow Sea at a cost of about US\$4 million. The recapture rate was 4.6-8.2%. This amounted to 4800 tons with a value of US\$24 million in 1986.

In the Philippines, the government plans to disperse milkfish and shrimp. SEAFDEC/AQD also plans the sea ranching of reef fishes off Malalison in western Panay. Snapper juveniles will be test-released in the artificial reefs that will be deployed around the island. Stock enhancement of the abalone *Haliotis asinina* is also planned in depleted areas.

Sources: (1) Csavas. *Recent developments in coastal aquaculture in the Asia-Pacific*. INFOFISH International. 4/89. (2) YC Shang. *Marine shrimp farming in PR China*. INFOFISH International. 2/89. (3) 1992-1993 Report of SEAFDEC Aquaculture Department.